

# AI/ML Panel

## PRACTICAL AND SAFE IMPLEMENTATION OF AI/ML FOR AVIATION PURPOSES

Wes Ryan – NASA Ames (Nasa Aeronautics Research Institute)

April 27, 2022, Panel 4:00 – 4:45 pm



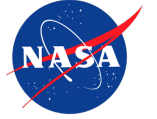


# Practical AI/ML Use in Aviation

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- AI/ML Can Provide Transformational Capabilities – Great Potential
- Capabilities and Safety Assurance Rigor Require More Than “Levels” of AI/ML
- Must Consider Intended Function, Use Case, and Operational Risk
- Safety Hinges on Bounded Behavior/Authority
- R&D Partnerships with NASA For Maturation and Integration Strategies (Aircraft, Operations, and Airspace Integration Capabilities)

# AI/ML & Automation Construct

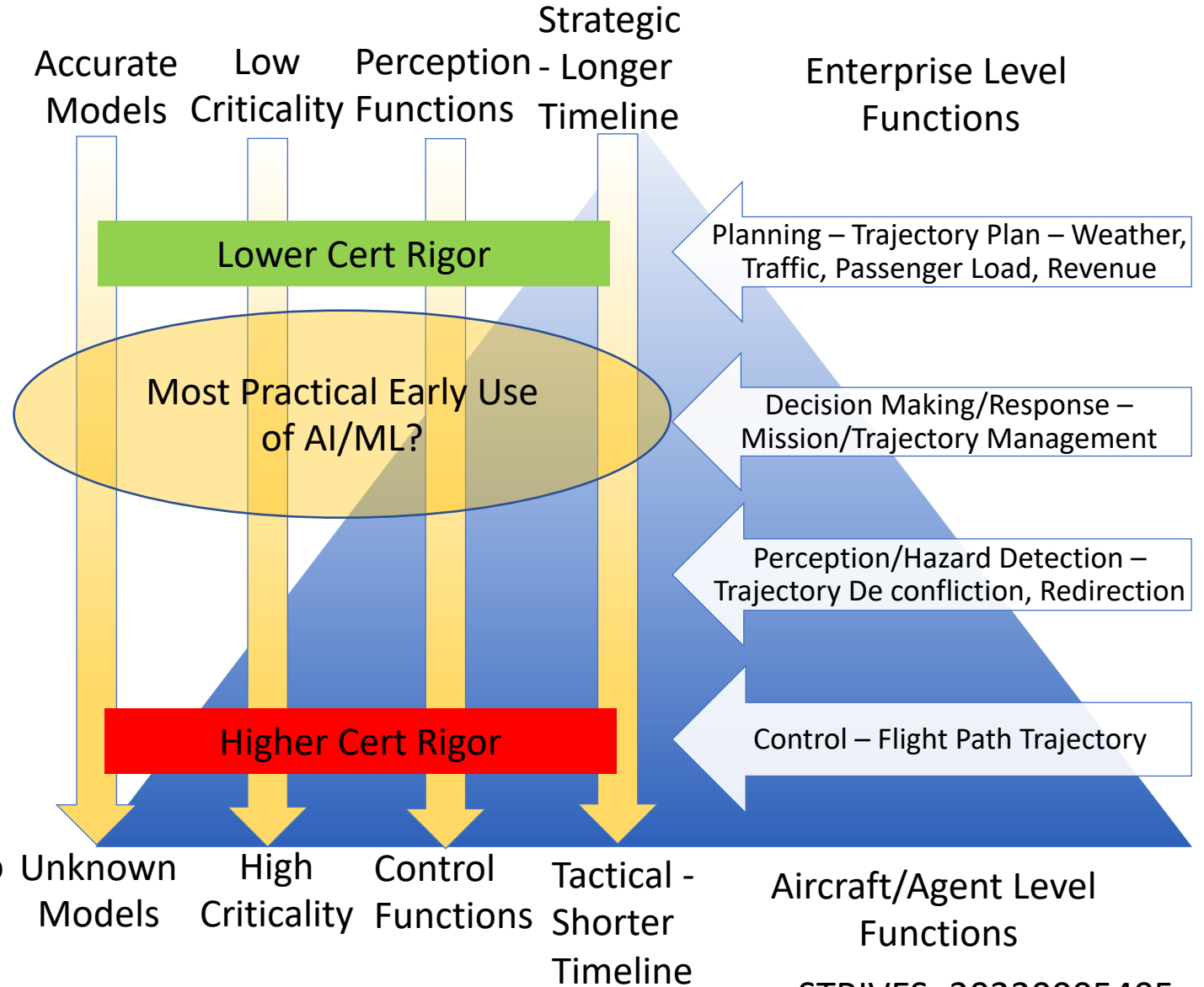


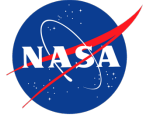
## Given:

- Perception Functions Are More Difficult to Model, Less Bound by Known Model/Physics
- Control Functions Well Understood, Governed by Flight Dynamics and Physics of Aircraft/Trajectory Models
- Tactical Decisions Have Shorter Timeline, Greater Urgency
- Strategic Decisions Have Longer Timeline, Less Urgency

## Our Shared Challenge:

- Where Should We Focus Automation & AI/ML in the Near Term, Mid Term, Long Term? Safety Critical or Route Efficiency Improvement Functions?
- What Risks/Challenges Do We Face for Moving Automation & AI/ML from Tactical to Strategic Decision Making, or From Control Functions to Perception Functions?





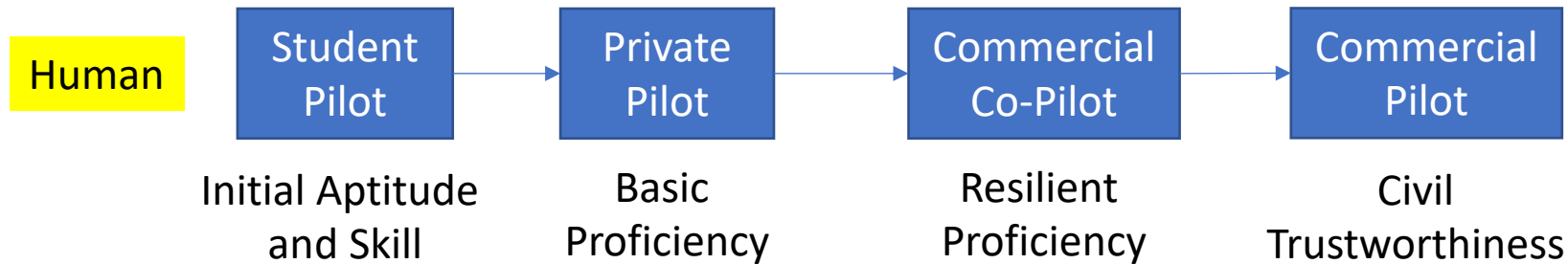
# Backup Slides

# Building-in Robust Safety Assurance

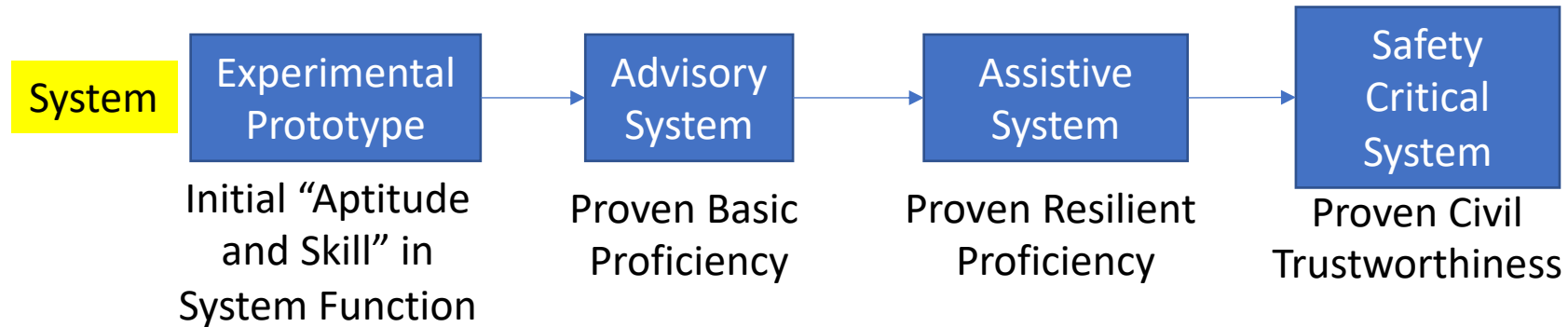


- Compare Risk-based, Model Based Automation Development to Pilot/Crew Development Process
- How Do We Build In Proficiency, Robust Function?

Scenario-based Training With Instructor + Repetition + With Expected Outcomes/Behavior



Simulation & Flight Test to Demonstrate Readiness for Intended Use, Type of Operation, Task Criticality



Must Work-up to Resilient/Robust Assurance in Automation Designs



# Notional Automation Capability Maturity Model

**Capability**

New ability, expertise,  
or proficiency

**Functions/  
Services**

Task, role, and/or  
system effects which  
enable a *Capability*

**Technology**

Equipment including  
HW/SW which  
provides *Function/  
Service*

**Data**

Information sources  
used by *Technology*

**Must assess maturity, integrity, reliability, availability, etc. of data sources & technology to implement an intended function in support of a new capability**



# Benefit of Using CMM Concept for Automation

- Methodical Progression from Prototype, to Initial Function with Human Monitoring/Backup, to Safety Responsible Function
- Common Framework for Analyzing Each Step Towards Proven Capability

